

22711



IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor Mario GAMBETTI
Patent App. 10/692,882
Filed 24 October 2003 Conf. No. 1944
For SLEEVE TYPE PACKAGING MACHINE SYSTEM,
 PARTICULARLY USEFUL FOR CHANGING REELS

Art Unit 3721 Examiner Desi,
Hon. Commissioner of Patents Allowed: 9 September 2004
Box 1450
Alexandria, VA 22313-1450

PETITION FOR CONSIDERATION OF
INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97(d) it is requested that the accompanying Information Disclosure Statement be considered. There has been no formal office action on the merits although obviously since the case has been allowed there has been consideration on the merits.

In the European Office Action, the only reference additionally made of record is GB 2 241 483 which has been cited only as technological background. Hence there should be no need for a certification. Consideration of the Information Disclosure Statement is requested.

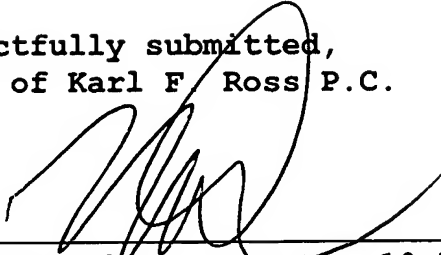
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Atty's 22711

Pat. App. 10/692,882

A charge form applying the fee of \$130.00 under 37 CFR
1.17(I) is enclosed.

Respectfully submitted,
The Firm of Karl F. Ross P.C.



By: Herbert Dubno, Reg. No. 19,752
Attorney for Applicant

Enc: Information Disclosure Statement
PTO 2038 Charge Form

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IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor Mario GAMBETTI

Patent App. 10/692,882

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Conf. No. 1944

For SLEEVE TYPE PACKAGING MACHINE SYSTEM,
PARTICULARLY USEFUL FOR CHANGING REELS

Art Unit 3721

Examiner Desi,

Hon. Commissioner of Patents

Allowed: 9 September 2004

Box 1450

Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

UNDER 37 CFR 1.97(d)

There is enclosed a copy of a European Search Report in the corresponding application EP 03 02 4741 and a copy of the two references cited therein, namely, United States Patent 5,203,144 and GB 2 241 483.

Since the Notice of Allowance has issued in the case, a petition is enclosed pursuant to 37 CFR 1.97(d) requesting consideration of the Information Disclosure Statement together with a charge form applying the fee under 37 CFR 1.17(I) to the charge card of the undersigned.

For the record it is noted that the first of these references, namely, United States Patent 5,203,144 has been cited by the Examiner as Reference A on the PTO 892 form attached to the Notice of Allowability. The United Kingdom patent has been applied only in Category A as technological background.

Consideration of the latter reference is requested, the former reference having previously been considered.

Respectfully submitted,
The Firm of Karl F. Ross P.C.


By: Herbert Dubno, 19,752
Attorney for Applicant

Enc: Search Report
PTO Form 1449 and references
Petition
PTO 2038 Charge Form

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ATTY DOCKET NO.

SERIAL NO.

22711

10/692,882

LIST OF PATENTS
AND PUBLICATIONS

APPLICANT

Mario GAMBETTI

FILING DATE

24 2003ober

GROUP

3721



U.S. PATENT DOCUMENTS

EX. INIT		DOCUMENT NO. Cntry code - No.	DATE MM-YYYY	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	AA	US-5203144	20 April 93	GAMBETTI			
	BB	US-					
	CC	US-					
	DD	US-					
	EE	US-					
	FF	US-					
	GG	US-					
	HH	US-					

FOREIGN PATENT DOCUMENTS

		DOCUMENT NO. Cntry Code - No.	DATE MM-YYYY	COUNTRY	NAME	CLASS	TRANSL.	
							YES	NO
	AI	GB 2 241 483	4 Sept. 91	GREAT BRITAIN				
	AJ							
	AK							
	AL							
	AM							
	AN							
	AO							
	AP							
	AR							

OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AS	
	AT	
	AU	

EXAMINER
Desi,

DATE CONSIDERED

EXAMINER: Initial if Reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

24 September 2004

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 02 4741

227V
JN 10/692882

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A, D	US 5 203 144 A (GAMBETTI MARIO) 20 April 1993 (1993-04-20) * abstract; figure 1 *	1	B65B11/10 B65B59/04
A	GB 2 241 483 A (CUNNINGHAM & JEPSON LTD ; CUNNINGHAM AND JEPSON PACKAGIN (GB)) 4 September 1991 (1991-09-04) * page 7, line 8-12; figure 1 *	1, 10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 February 2004	Examiner Grentzius, W
<div>CATEGORY OF CITED DOCUMENTS</div> <div><div>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : Intermediate document</div><div>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</div></div>			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 02 4741

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-02-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5203144 A	20-04-1993	IT 1246637 B	24-11-1994
		DE 4207759 A1	08-10-1992
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		FR 2674818 A1	09-10-1992
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		WO 9112176 A1	22-08-1991

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(43) Date of A publication 04.09.1991

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(52) UK CL (Edition K)
B8C CF2 CW1
B4B B11B2 B16B B16C B16G8 B70F
U1S S1815

(56) Documents cited
GB 1361162 A GB 1025323 A US 4633647 A

(58) Field of search
UK CL (Edition J) B8C CF2 CU1 CW1 CW5
INT CL⁶ B65B

(54) Overwrapping apparatus

(57) A wrapping apparatus for a packaging machine comprises three conveyors 10, 40, 14, a film feed mechanism 24, 26, a film clamping and weakening apparatus 32 and a wrapping arrangement comprising a rotatable arm 42 having at each end a wrapping bar 46A, 46B. Leading edge 38 of the film is trapped between a package 74 as it moves from conveyor 10 on to conveyor 40 and the motion of the package and wrapping arrangement will draw film from an airtight-maintained dancing loop 30. When sufficient film has been drawn, the clamping and weakening apparatus 32 will operate to clamp the film and the relative motion of the package and wrapping bar relative to the clamping apparatus will tear the film along a transverse line of weakness previously made by the apparatus 32. One of the bars 46A, 46B will wrap the tail of the separated length of film over the package 74 and the tail of the separated length will be caught under the package as it transfers from conveyor 40 to conveyor 14.

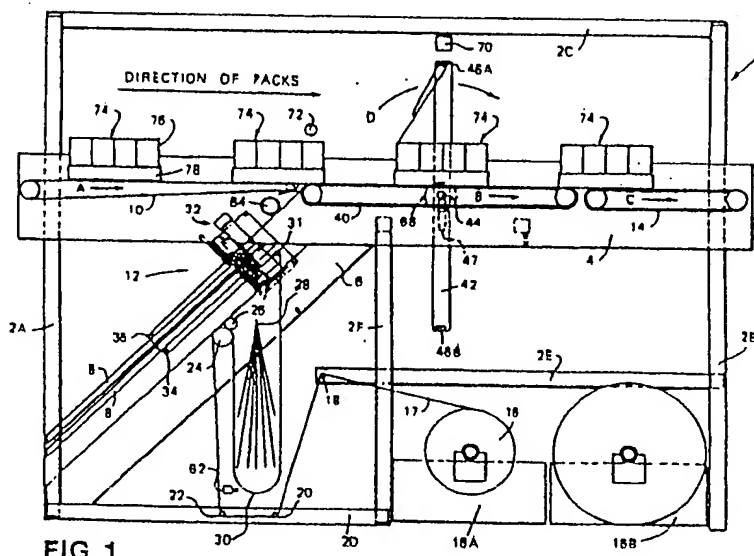


FIG. 1

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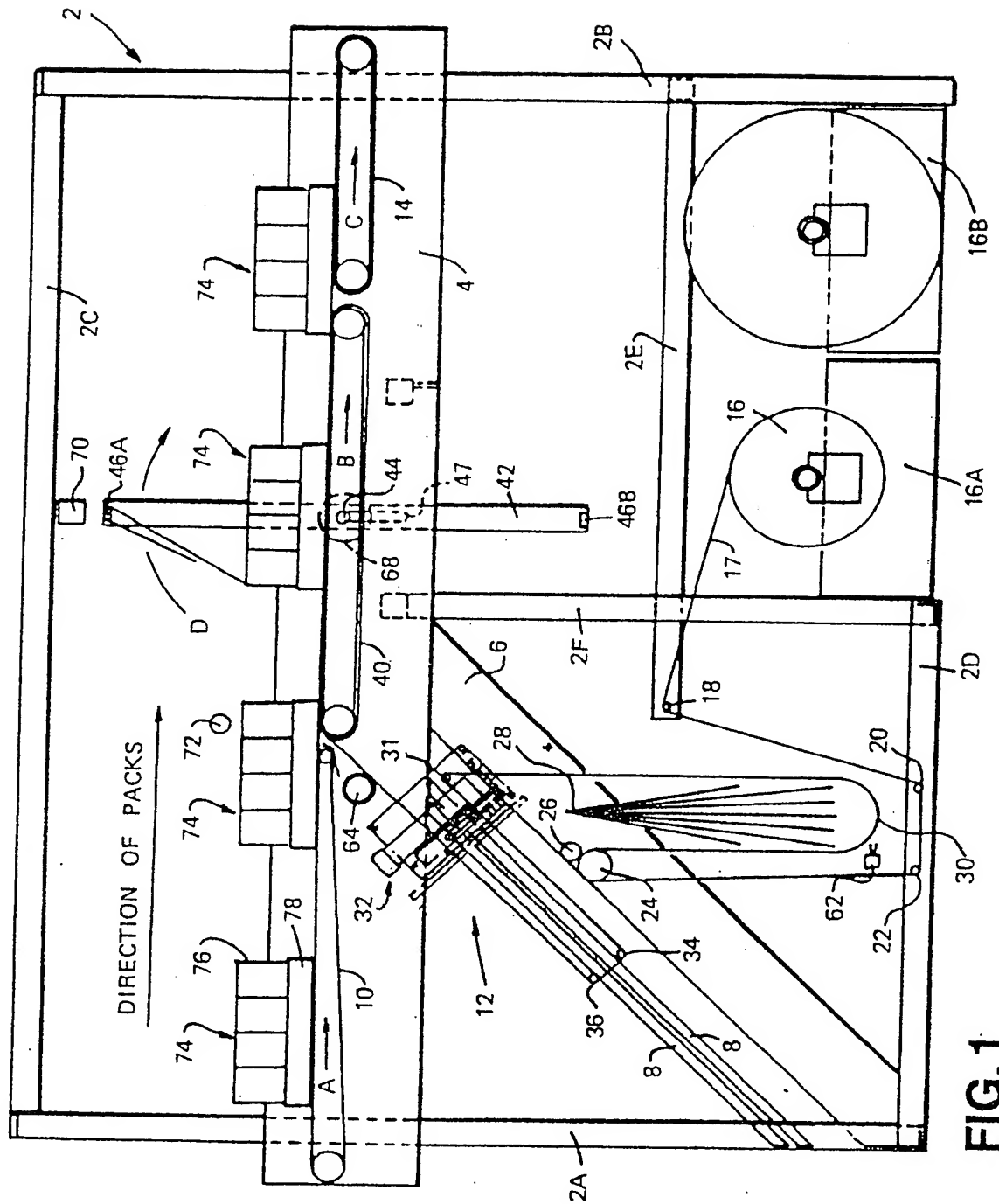
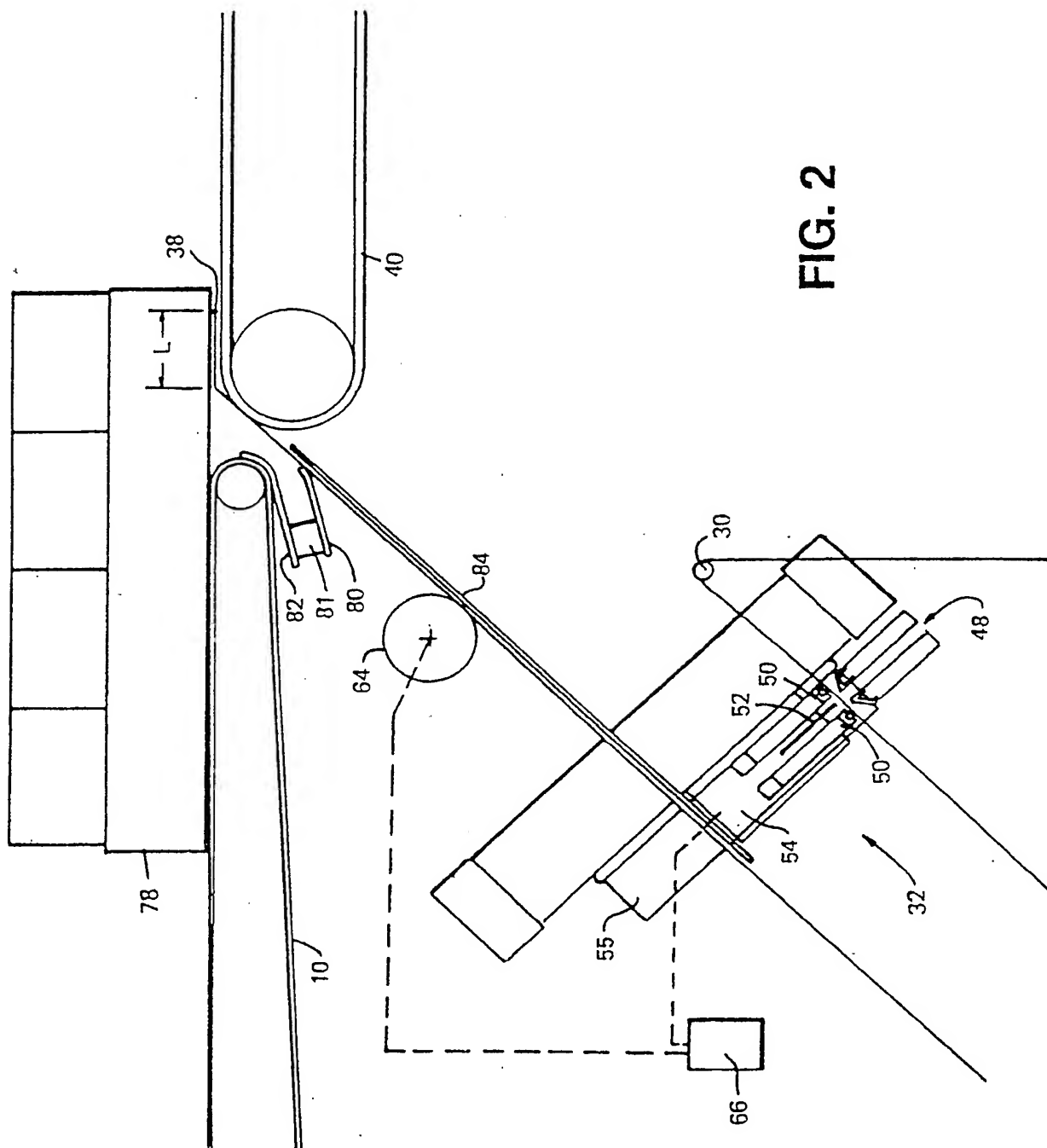


FIG. 1

FIG. 2



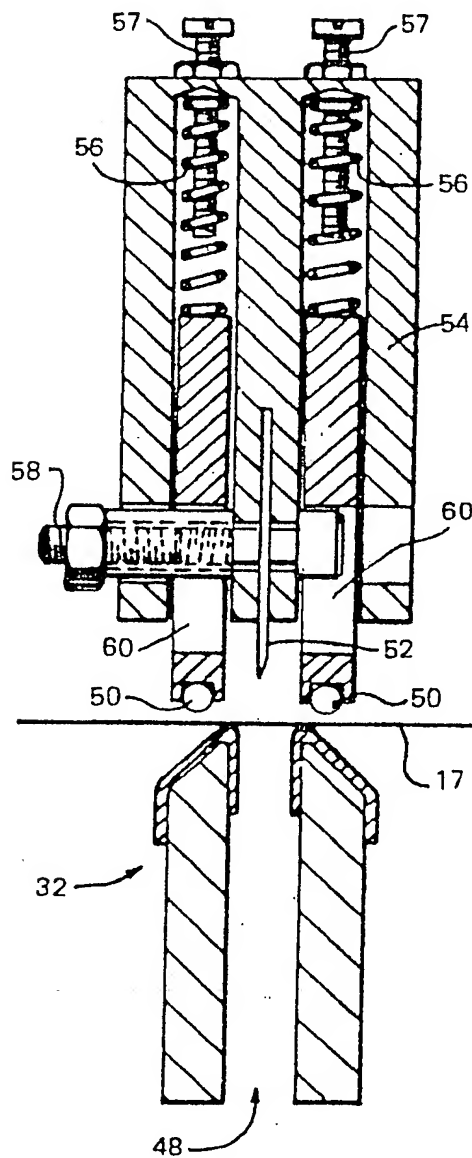


FIG. 3

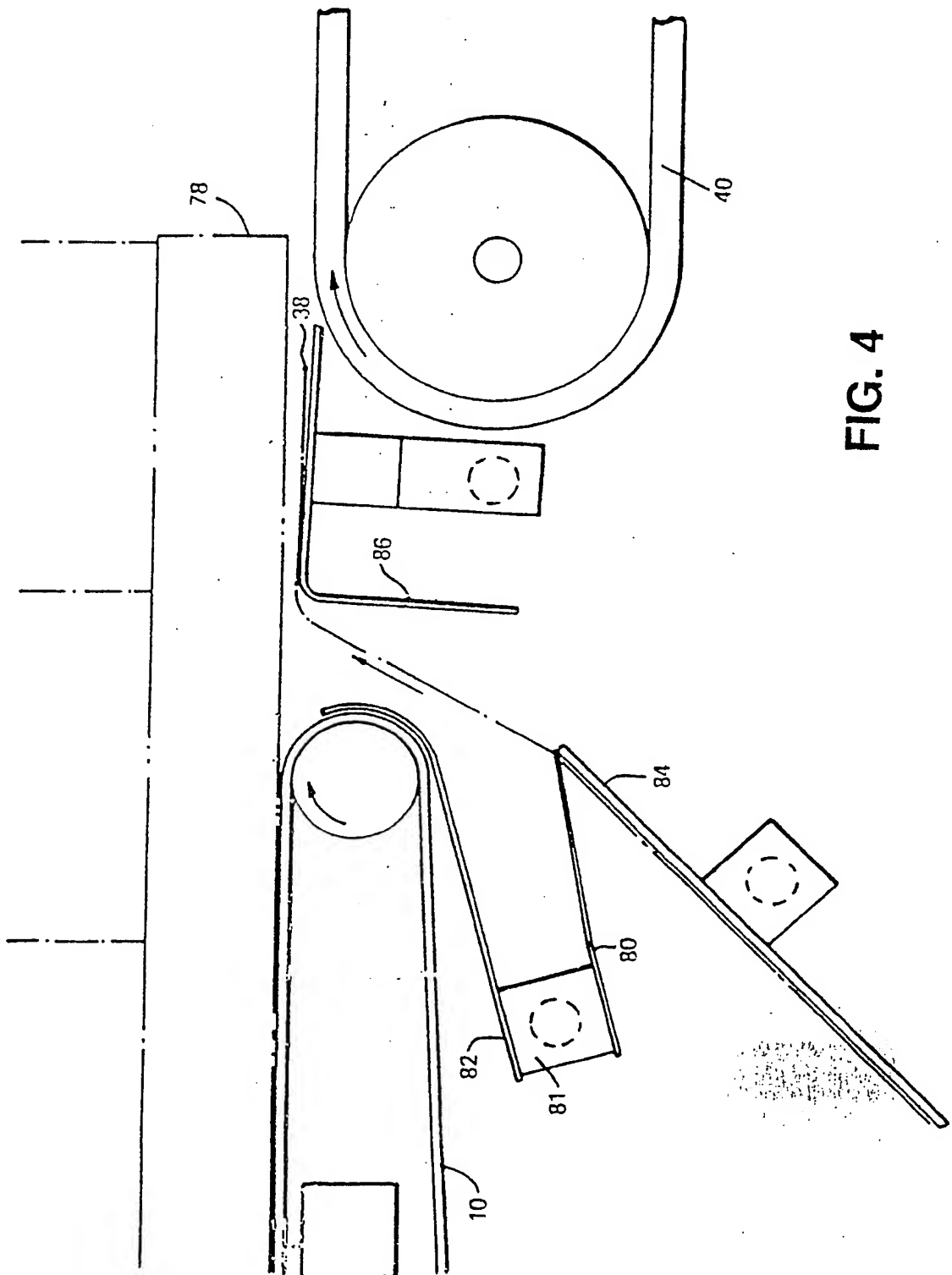


FIG. 4

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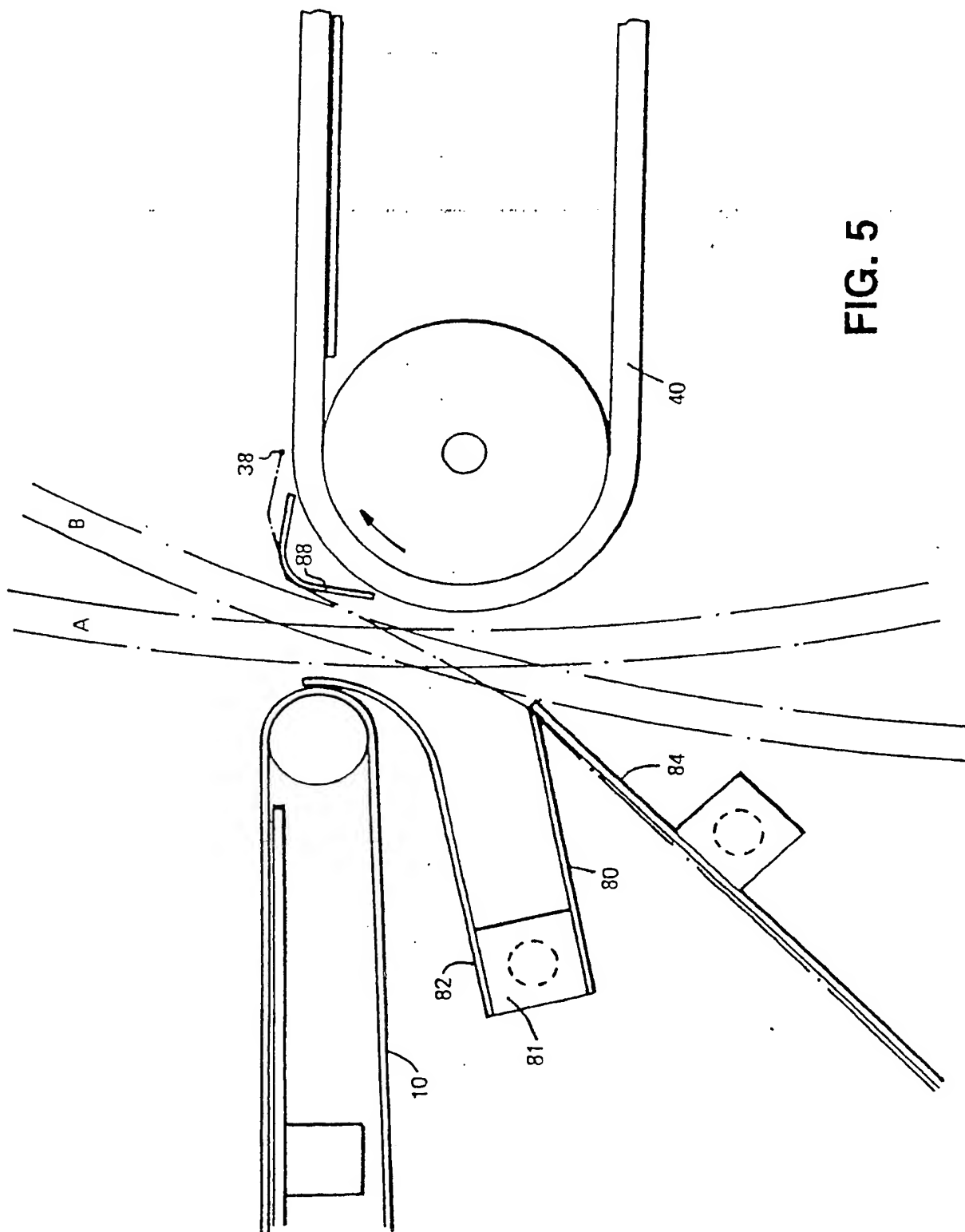


FIG. 5

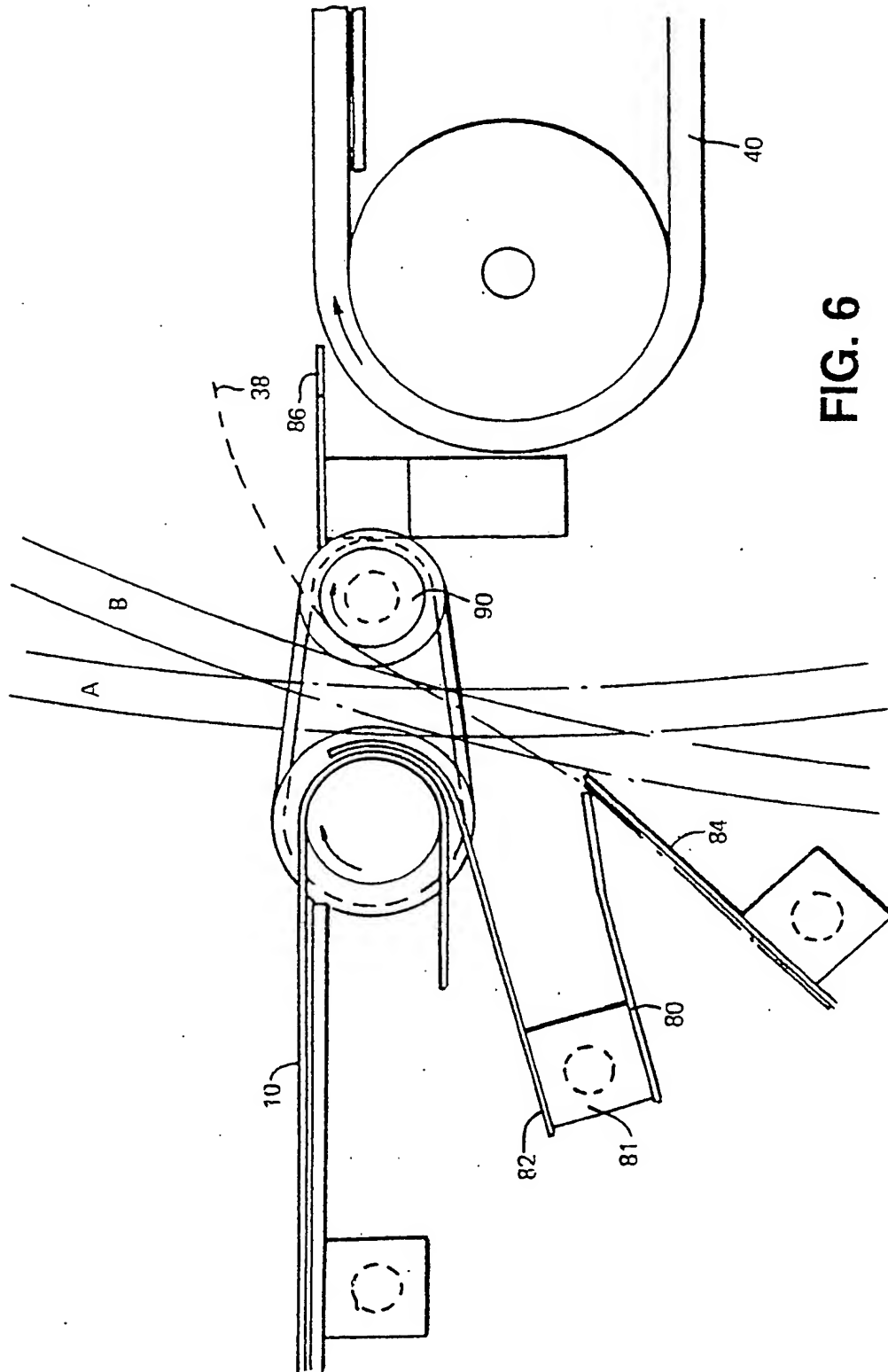


FIG. 6

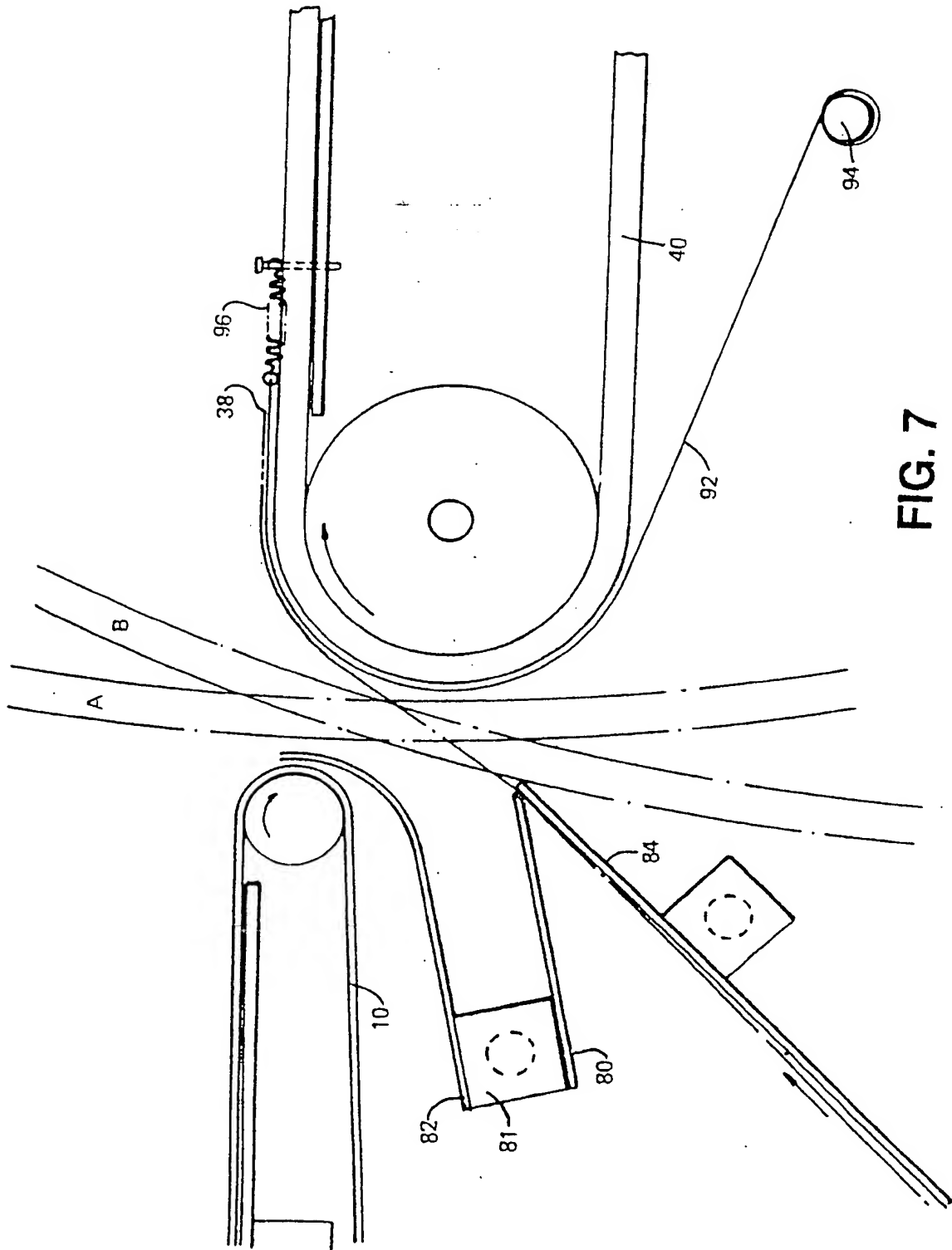
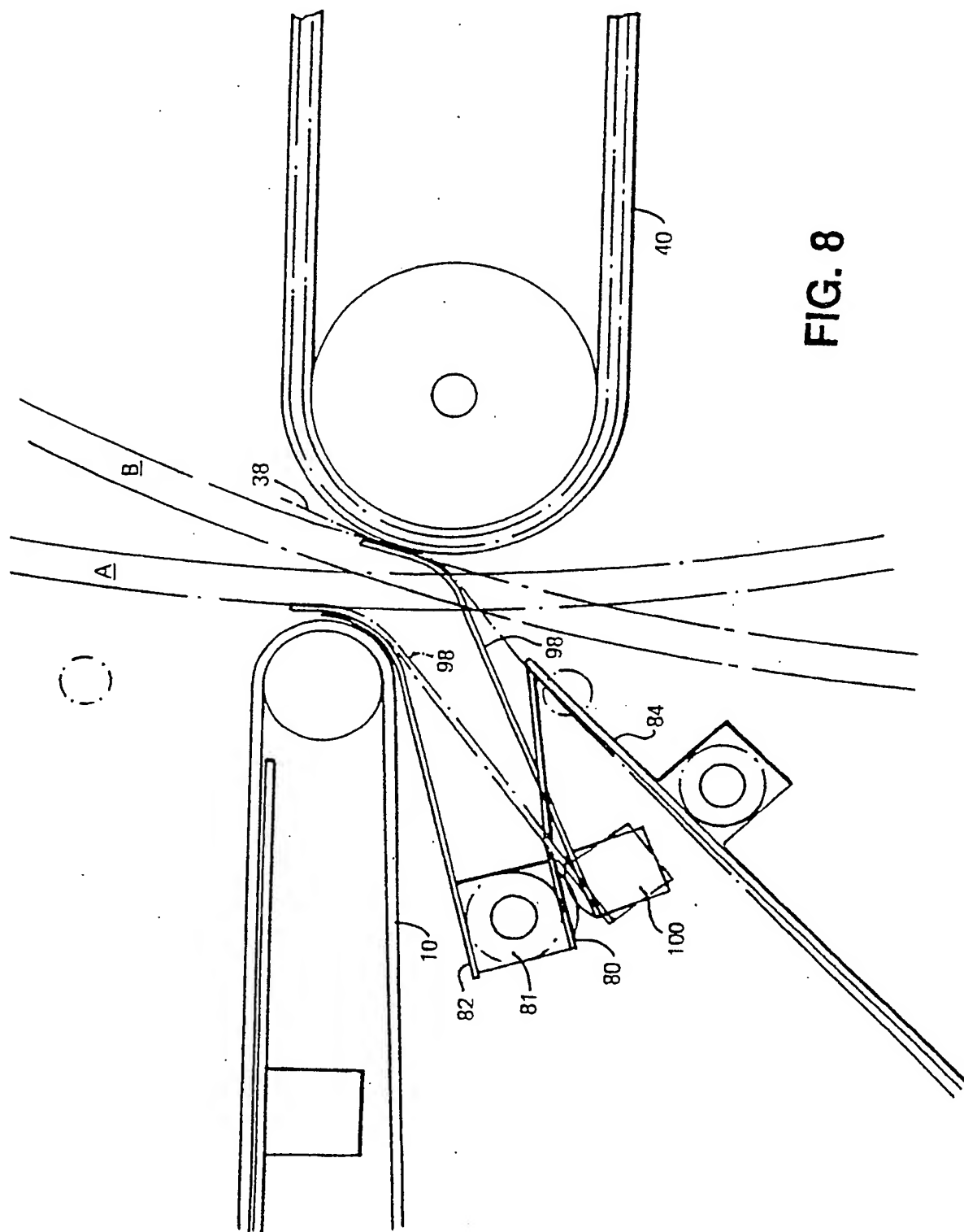


FIG. 7



SPECIFICATIONIMPROVEMENTS IN OR RELATING TO OVER-WRAPPING APPARATUS FOR
PACKAGING MACHINES

The present invention relates to apparatus for wrapping a film of plastics material over a package or group of articles.

It is a common practice to overwrap products such as canned and bottled products with a wrap of clear plastics material which is shrunk into position in a heat tunnel. For example, the products can comprise canned beers which are standing in shallow trays in groups of cans.

In order to wrap a length of clear plastics material over the tray the length of material to be wrapped is supplied from a roll of plastics material, and cut to length and transported in cut lengths on a conveyor. Each cut length is wrapped over the filled tray by means of bars attached between a pair of driven chains.

It has been found that such an arrangement has a number of disadvantages. The arrangement requires the provision of a separate conveyor system to convey each sheet of wrapping material. A variable speed sheet transport system is required to match the conveyor speeds of the packaging machine. A control arrangement is required to ensure that the sheet film transport feed rate matches the feed rate of the packaging machine itself. Also a sensing device is required to determine the presence or absence of a pack otherwise a sheet of film would otherwise be

supplied when no pack was available for wrapping.

The present invention seeks to provide pack overwrapping apparatus which does not require a sheet of wrapping material to be cut to length, variable speed conveyor means for the sheets to be transported to a pickup point, or anti-static devices and air jets to control the leading edge of each sheet.

Accordingly the present invention provides apparatus for wrapping film around a continuously moving package, the apparatus comprising, conveying apparatus for transporting a series of packages, the packages being located in a spaced apart relationship, means for feeding film from a roll of wrapping film, means for weakening the film, means for clamping the film, wrapping means to wrap film around a package whilst the package is in motion, the clamping and weakening means being operable to clamp the film and create a line of weakness across the width of the film, and release the film to allow a sufficient length of film for the package to be wrapped and drawn by the wrapping means, the clamping means being operable to clamp the film so that a sufficient length of film is parted along the line of weakness by the motion of the package and the wrapping means relative to the clamping means.

The conveying apparatus can comprise a first conveyor on which packages to be wrapped are located, a second conveyor on which the packages are located during wrapping, and a third conveyor on which wrapped packages are located and transported to a shrink tunnel.

The discharge end of the first conveyor can be located above the input end of the second conveyor.

The speed of the second conveyor can be higher than the speed of the third conveyor.

The clamping and weakening means can include a pair of jaws and a perforating knife.

One of said pairs of jaws can be fixed whilst the other pair of said jaws can be moveably secured in mounting means.

The said other pair of jaws can be slideably located in the mounting means and urged against stop by a pair of springs.

The stop can comprise a bolt which clamps the perforating knife in position and which lies in an elongate slot in each one of the jaws of the said other pair of jaws.

The other pair of jaws can extend beyond the edge of the weakening means.

The apparatus can include film guide means located between the clamping and weakening means and the conveying apparatus, the film guide means and the clamping and weakening means being moveable relative to one another.

The clamping and weakening means can be fixed in position and the film guide means can be moveable.

Alternatively the film guide means can be fixed and the clamping and weakening means can be moveable.

The film guide means can comprise a pair of guide rollers, or a static semi-cylindrical plate with air injection through holes in the plate to reduce friction.

The apparatus can include film length measuring means arranged to operate the film clamping and weakening means so as to clamp the film and make a line of weakness after a predetermined length of film has been measured.

The film length measuring means can comprise a measuring wheel having an output signal to operate the clamping and weakening means.

The wrapping means can comprise at least one rotatable wrapping bar.

The wrapping means can comprise a pair of wrapping bars located at the extremities of a rotatable arm.

The wrapping apparatus can include position sensing means having an output signal to operate the clamping and weakening means so as to clamp the film and make a line of weakness.

The position sensing means can comprise an encoder.

In an alternative arrangement the position sensing means can comprise a proximity switch.

The film feeding means can comprise a pair of driven rollers and can include a film loop sustaining means comprising an air jet to create a loop of film, a detector to sense the end of the loop, the detector generating a signal to cause the film feeding means to operate and restore the loop to a predetermined size. The film length measuring means can be located between the film loop sustaining means and the conveying apparatus.

Each package to be wrapped can comprise a plurality of containers arranged in a group and located in a shallow tray.

The present invention will now be more particularly described with reference to the accompanying drawings in which,

Fig. 1 shows a schematic side elevation of part of a packaging machine incorporating one form of overwrapping apparatus according to the present invention,

Fig. 2 shows a portion of the overwrapping apparatus of Fig. 1 to a larger scale,

Fig. 3 shows a detail of the film clamping and perforating apparatus of the overwrapping apparatus shown in Figs. 1 and 2, and

Figs. 4 - 8 inclusive each show different alternative arrangements of a part of the overwrapping apparatus shown in Fig. 1.

Referring to the drawings, a packaging machine includes a support structure comprising two side frames 2 secured together in a spaced apart parallel relationship by cross members (not shown). Each side frame comprises two upright parallel members 2A, 2B joined together at their upper ends by a horizontal member 2C. Two further horizontal members 2D and 2E are attached respectively to the upright members 2A and 2B, and are both attached to a further upright member 2F as shown in Fig. 1. A horizontal side plate 4 is attached between each upright 2A and 2B of each side frame 2 and is also attached to the upper end of each upright member 2F. A diagonal support plate 6 is attached between each side plate 4

and the upright member 2A and horizontal member 2D of each side frame 2. Two diagonally extending support bars 8 are also attached between the side plate 4 and upright member 2A of each side frame 2. A motor driven input conveyor 10, an overwrapping apparatus generally indicated at 12, and a motor driven output conveyor 14 are attached to the support structure, particularly between the side-plates 4.

The overwrapping apparatus 12 comprises a roll 16 of wrapping film 17 the roll 16 being mounted on a support structure 16A, so that it can be easily moved into and out of position relative to the members 2B, 2E and 2F. A spare roll of film is similarly mounted on a further support structure 16B. The film 17 passes over guide rollers 18, 20, 22 and through a pair of motor driven feed rollers 24 and 26. The guide roller 18 is mounted between the horizontal members 2E of each side frame 2 and the rollers 20 and 22 are mounted between the horizontal members 2D of each side frame 2. The motor driven rollers 24 and 26 are mounted between the diagonal supports 6 on each side frame 2. An air jet means 28 located between the plates 6, generates a 'dancing loop' 30 in the film and the film then passes over a guide roller 31, through a clamping and perforating apparatus 32 described in more detail with reference to Fig. 2, and over two further guide rollers 34 and 36. The guide rollers 34, 36 are secured between the bars 8 on each side frame 2, and are adjustable on the bars by means of a rack and pinion (not shown) to vary the distance between the rollers 34, 36 and the apparatus 32. As well as, or instead of rollers 34, 36 being adjustable on the bars 8, the apparatus 32 can also be moved with respect to the rollers 34, 36. Free end 38 of the film is located on the input side of a conveyor 40.

A motor driven overwrapping arm 42 is mounted on a shaft 44 which extends between the side plates 4 and is mounted in bearings (not shown) which are located in bearing housings (not shown) attached to the side plates 4. Two rectangular section wrapping bars 46A, 46B are located at the extremities of the overwrapping arm 44.

The side plate 4 on which the overwrapping arm 42 is mounted is provided with a slot 47. The slot 47 allows the overwrapping arm to be moved vertically within limits, the shaft on which the operating arm is located passing through the slot. The purpose of providing this adjustment is described below.

The film clamping and perforating apparatus 32 shown in more detail in Fig. 2 and Fig. 3 is secured to the bars 8 on each side frame 2 and comprises two pairs of clamping jaws 48 and 50 and a perforating knife 52. The pair of jaws 50 and the blade 52 are located in a moveable mount 54. Each jaw 50 is moveable within the mount 54 against a load exerted by a number of spaced springs 56. A bolt 58 which also clamps the knife 52 in position engages slots 60 in each jaw 50 and limits the travel of each jaw 50. The apparatus 32 can be operated by moving the mount of 54 or the jaws 48 using a pneumatic ram 55 so that initially the pairs of jaws 48 and 50 clamp the film 17 only, then both the jaws 48 and 50 clamp the film and the knife 52 perforates the film. Adjustable stop screws 57 (Fig. 3) limit the degree of retraction of the jaws 50, and thereby control the depth of penetration of the knife 52, and thus the amount of perforation.

A photoelectric detector 62 is located adjacent the loop 30 and an output signal from the detector controls the drive of the rolls 24 and 26 as will be described below. A film length encoding wheel 64 arranged to be driven by the film is located adjacent the clamping and perforating apparatus 32 which is also provided with a film length pulse counter 66 to control its operation.

As an alternative to the encoding wheel 64, the overwrapping arm 42 has an encoder 68 to detect the position of the overwrapping arm and to provide a signal to operate the mechanism 32. A proximity switch 70 can be provided to perform the same function as the encoder 68.

A photoelectric detector 72 can be provided if necessary to detect the presence or absence of a pack to be wrapped in order to prevent the apparatus 32 functioning if no pack is present. When a film length measuring wheel is used, e.g. wheel 64, if a pack is not present film will not be drawn off, the measuring wheel 64 will not be rotated, and the clamping and perforating apparatus 32 will not function.

The input conveyor 10 is positioned slightly higher than the conveyor 40 (see Fig. 2) and the output conveyor 14 is run at a slightly lower speed than the speed of the conveyor 40.

The overwrapping apparatus is designed to wrap packs 74 of products with lengths of film from the roll 16 and to feed the wrapped packs to a shrink tunnel (not shown) where heat is applied to the film causing it to shrink down and enclose each pack. Typically each pack comprises a number of canned or bottled products 76 grouped together, and standing in a shallow tray 78.

A number of sprag fingers 80 are located on a cross-member 81 at the discharge end of the conveyor 10, to assist in holding the film 17 in position. Alternatively the measuring wheel 64 can be provided with a sprag clutch (not shown) to hold the leading edge 38 in position while it awaits a pack 74. A plate 82 prevents the film making contact with the input conveyor belt 10 which would tend to drive the film in the reverse direction to that required.

A film support plate 84, supports the film 17 adjacent the free end 38, particularly in the region of the measuring wheel 64 and the fingers 80.

In order to load the overwrapping apparatus with film, a control system of the apparatus which includes the detector 62, encoder 64, pulse counter 66, or alternative encoder 68 or switch 70, and detector 72 is switched to a position which opens and disables the clamping and perforating apparatus 32. The film 17 is drawn off the roll 16 and passed over the guide rollers 18, 20 and 22 and between the driven rollers 24 and 26, over the guide roller 31 and through the clamping and perforating apparatus 32 over the guide rollers 34 and 36, and between the plate 84 and the wheel 64, and fingers 80, so that the leading edge 38 of the film 17 is located of the input end of conveyor 40 as shown in Fig. 2. The length of film required will vary according to the height and length of the packs 74. The length (L) of the film can be varied

by alteration of the number of pulses signalled by the measuring wheel 64 before operating the perforating knife 52. The guide rollers 34 and 36 are positioned on a slide constituted by the bars 8 and can be clamped into position to suit the length (L) of film required. In an alternative arrangement not illustrated, the clamping and perforating apparatus 32 can be moveable with respect to the guide rollers 34 and 36 which are fixed in position.

The length of film required for each wrapping operation, i.e. the length of film between adjacent lines of weakness can be varied by adjusting the pulse counter 66 to operate the clamping and perforating apparatus 32 so that a greater or lesser number of pulses are received from the measuring wheel 64, or the encoder 68. The position of the leading edge 38 of the film is determined by the position of the rollers 34, 36.

The control system of the overwrapping apparatus is then set to run, and the jaws 48 are driven by the ram 55 to close the clamping jaws 48 and 50, and the perforating knife 52 perforates the film creating a first line of weakness. The timing mechanism 66 of the control system releases the jaws 48 and 50, and with the air jet means 28 operating to form the 'dancing loop' 30, the conveyors 10, 40 and 14 and the overwrapping arm 42 are driven each at a constant speed through a wrapping cycle in the directions indicated by arrows A, B, C and D respectively. A series of packs 74 on the conveyor 10 are fed onto the conveyor 40. As the conveyor 10 is set higher than the conveyor 40, each

pack does not contact the leading edge of the film until the trailing edge of the pack tray drops from the conveyor 10 onto the conveyor 40. The jaws 48 and 50 having just been released the film 17 is trapped between the rear-end of the pack and the conveyor 40 and is drawn from the 'dancing loop' 30.

When the back of the pack has cleared the input end of the conveyor 40, one of the wrapping bars 46A, 46B passes through the film path and the film accelerated so that the film is drawn from the 'dancing loop' at a greater speed than the speed of the conveyor 40. When the perforations dividing the trailing edge of the first film length from the leading edge of the next film length reaches a predetermined position the pulse counter 66 operates and the jaws 48 are driven so that the jaws 48 and 50 are closed and the perforating blade 52 operates to create the next line of weakness. There will be an immediate rise in film tension and the film is parted along the first line of weakness by virtue of the motion of the pack 74 and wrap bar 46A or 46B relative to the stationary jaws 48, 50 which are holding the film in position.

The first length of parted film continues to be wrapped over the pack on the conveyor 40 by one of the bars 46A, 46B, and the free end of the first film length is taken into the gap between the conveyors 40 and 14. During this latter part of the wrapping operation, the tail of the first film length is controlled by static belts (not shown) located above each pack. The end of the film length is then wrapped under the tray as the pack 74 transfers from conveyor 40 onto conveyor 14.

As the conveyor 14 is run at a lower speed than the conveyor 40 the first film length is tightened around the pack prior to the wrapped pack entering the shrink tunnel.

The leading edge of the next film length is left above the gap between the conveyors 10 and 40 awaiting clamping and drawing out by the next pack 74.

The predetermined position of the perforations dividing one length of film from the next length is signalled by the film measuring wheel 64 which causes the clamp and perforating apparatus 32 to be operated, to clamp the film and create the next line of weakness.

The 'dancing loop' 30 is maintained as the film is drawn off by operation of the driven rolls 24 and 26 which in turn operate in response to a signal from the photoelectric detector 62.

As the tail of a length of film is wrapped over the top of a package, the static belts help to prevent or reduce 'ballooning' of the film. This effect arises due to air being trapped between the film and the top of the package, and is particularly apparent when wrapping takes place at relatively high speeds. The 'ballooning' effect can be attenuated by reducing the distance between the film and the package as the film is taken over the top of the package by one of the wrapping bars. The reduction can be

achieved by lowering the shaft 44 in the slot 47 by re-positioning the housings of the bearings of the shaft 44. It will be clear that the smaller the gap between the package and the film, the less air will be present to cause 'ballooning'.

The conveyors 10, 40 and 14 and the wrapping arm 42 are all driven at a constant speed throughout the wrapping cycle by means of chains from the main drive rotor motor (not shown) of the packaging machine. It will be appreciated that a wrapping machine according to the present invention eliminates the need for the provision of mechanical or electrical cyclically variable speed drives.

It is important that the leading edge 38 of the film 17 is trapped — between the pack 78⁴ and conveyor 14 at a location adjacent the rear-ward end of the pack 78.

For example, if the tray 78 cannot support the weight of products in the tray, the tray may deflect under the weight of the products as the tray is transferred from the conveyor 10 to the conveyor 40. Thus the leading edge 38 of the film 17 could be trapped between the middle or towards the front of the tray 78 and the conveyor 40. If this occurs then the leading edge 38 of the film could fall between the conveyors 40 and 14 before the trailing — edge ~~of each~~ of the film length can be folded underneath the tray.

Any light contact between the tray 78 and the conveyor 40 can be resisted by keeping the jaws 48 and 50 closed until the tray has reached the required position. This required position can then be detected by a photoelectric cell (not shown) adjustably positioned on the wrapping conveyor which operates to release jaws 48, 50. If there is a heavier pressure between the tray and the conveyor 40 whilst the film is clamped the film may be stretched and could then spring back down the gap between the conveyors 10 and 40 or may damage the film.

This tendency can be overcome by the use of dead plate 86 (Fig. 4) or 88 in Fig. 5. In both cases the dead plates are attached between the side plates 4. The film can rest on the dead plate whilst waiting to be drawn forward when contacted by the tray when the tray trailing edge comes off the conveyor 10. Any premature nipping between the dead plate and the front of the tray would cause low film tension which can be more easily resisted by the jaws 48, 50.

The dead plate, 86, 88 can be preceded by a continuously driven or undriven roller freely rotatable 90 which is located as closely as possible to the path of the bars 46A, 46B as indicated by tracks A, B. This arrangement is illustrated in Fig. 6 and will assist the smooth feeding of the film when the jaws 48, 50 are released.

In order to overcome occasional problems caused by a batch of

of flimsy trays, a piece of sheet material 92, for example stainless steel sheet or PTFE coated cloth can be used to cover that part of the conveyor 40 where the film lies waiting release by the jaws 48, 50 when contacted by the required part of the tray. The sheet material 92 can be wrapped around a roller 94 so that it is anchored under the conveyor 40 and the material can be tensioned by a light spring 96 at each corner above the conveyor 40. The length of the sheet material 92 above the conveyor 40 can be varied by winding more or less material round the anchor roller 94.

The premature drawing forward of the film by the front edge of a drooping tray may be also prevented by the following arrangement as illustrated in Fig. 7. The line of weakness in the film 17 is set for the film to part with the leading edge 38 of the next length of film just below the level of the wrapping conveyor surface 40. At this position the leading edge 38 of the film cannot be contacted by a tray.

At the appropriate moment as signalled by a pack 74 breaking the beam of a position adjustable photoelectric cell (not shown), a number of spring steel fingers 98 which are set between the sprag fingers 80, are pivoted on a common shaft 100 which is powered by a solenoid (not shown) or an air cylinder (not shown).

The fingers 98 contact the film forcing it into contact with the highgrip conveyor belt 40. At the same moment the jaws 48, 50 are released and the

film is conveyed into the nip between tray and the wrapping conveyor belt 40. The fingers 98 are then returned to a parked position in order to avoid being struck by one of the bars 46A, 46B.

CLAIMS

17

- 1 Apparatus for wrapping film around a continuously moving package, the apparatus comprising conveying apparatus for transporting a series of packages, the packages being located in spaced apart relationship, means for feeding film from a roll of wrapping film, means for weakening the film, means for clamping the film, wrapping means to wrap film around a package whilst the package is in motion, the clamping and weakening means being operable to clamp the film and to create a line of weakness across the width of the film, and release the film to allow a sufficient length of film for the package to be wrapped and drawn through the apparatus by the wrapping means, the clamping means being operable to clamp the film so that the sufficient length of film is parted along the line of weakness by the motion of the package and the wrapping means relative to the clamping means.
- 2 Apparatus as claimed in claim 1 in which the conveying apparatus comprises a first conveyor on which packages to be wrapped are located, a second conveyor on which the packages are located during wrapping, and a third conveyor on which wrapped packages are located and transported to a shrink tunnel.
- 3 Apparatus as claimed in claim 2 in which the discharge end of the first conveyor is located above the input end of the second conveyor.

- 4 Apparatus as claimed in claim 2 or claim 3 in which the second conveyor is arranged to be driven at a higher speed than the speed of the third conveyor.
- 5 Apparatus as claimed in any one of the preceding claims in which the clamping and weakening means include a pair of jaws and a perforating knife.
- 6 Apparatus as claimed in claim 5 in which one pair of jaws is fixed and the other pair of jaws is moveably secured in mounting means.
- 7 Apparatus as claimed in claim 6 in which the perforating knife is secured in the mounting means.
- 8 Apparatus as claimed in claim 6 in which the said other pair of jaws are slideably located in the mounting means and are urged against a stop by a number of springs.
- 9 Apparatus as claimed in claim 8 in which the stop comprises a bolt which clamps the perforating knife in position and which lies in an elongate slot in each one of the jaws of said other pair of jaws.

- 10 Apparatus as claimed in claim 8 in which the said other pair of jaws extend beyond the edge of the perforating means.
- 11 Apparatus as claimed in any one of the preceding claims including film guide means located between the clamping and weakening means and the conveying apparatus, the film guide means and the clamping and weakening means being movable relative to one another.
- 12 Apparatus as claimed in claim 11 in which the clamping and weakening means is fixed and the film guide means is moveable.
- 13 Apparatus as claimed in claim 11 in which the film guide means is fixed and the clamping and weakening means is moveable.
- 14 Apparatus as claimed in any one of the preceding claims 11 - 13 in which the film guide means comprises a pair of guide rollers.
- 15 Apparatus as claimed in any one of the preceding claims in which the wrapping means comprises at least one rotatable wrapping bar.

- 16 Apparatus as claimed in claim 15 in which the wrapping means comprises a pair of wrapping bars located at the extremities of a rotatable arm.
- 17 Apparatus as claimed in claim 15 or claim 16 including position sensing means to detect the position of the or each rotatable bar and having an output signal to operate the clamping and weakening means to clamp and perforate the film.
- 18 Apparatus as claimed in claim 17 in which the position sensing means comprises an encoder.
- 19 Apparatus as claimed in claim 17 in which the position sensing means comprises a proximity switch.
- 20 Apparatus as claimed in any one of the preceding claims in which the film feeding means comprises a pair of driven rollers.
- 21 Apparatus as claimed in 20 including a film loop sustaining means comprising an air jet means to create a loop of film, a detector to sense the loop of film, the detector generating a signal to cause the film feeding means to operate and restore the loop to a predetermined size.

- 22 Apparatus as claimed in any one of the preceding claims including film length measuring means arranged to operate the clamping and weakening means so as to clamp the film and make a line of weakness after a predetermined length of film has been measured.
- 23 Apparatus as claimed in claim 22 in which the film length measuring means comprises a measuring wheel having an output signal to operate the clamping and weakening means.
- 24 Apparatus as claimed in either claim 22 or claim 23 in which the film length measuring means is located between the film loop sustaining means and the conveying apparatus.
- 25 Apparatus as claimed in any one of claims 16-19 in which the gap between a wrapping bar and a package to be wrapped is adjustable.
- 26 Apparatus as claimed in claim 25 in which the arm is mounted on a shaft which is vertically adjustable in a slot provided in a support structure for the wrapping means.
- 27 Apparatus as claimed in any one of the preceding claims 2 - 26 including a static plate located between the first and second conveyors and extending across the width of the conveyors, the leading edge of the film being arranged to lie upon the plate.

- 16 Apparatus as claimed in claim 15 in which the wrapping means comprises a pair of wrapping bars located at the extremities of a rotatable arm.
- 17 Apparatus as claimed in claim 15 or claim 16 including position sensing means to detect the position of the or each rotatable bar and having an output signal to operate the clamping and weakening means to clamp and perforate the film.
- 18 Apparatus as claimed in claim 17 in which the position sensing means comprises an encoder.
- 19 Apparatus as claimed in claim 17 in which the position sensing means comprises a proximity switch.
- 20 Apparatus as claimed in any one of the preceding claims in which the film feeding means comprises a pair of driven rollers.
- 21 Apparatus as claimed in 20 including a film loop sustaining means comprising an air jet means to create a loop of film, a detector to sense the loop of film, the detector generating a signal to cause the film feeding means to operate and restore the loop to a predetermined size.

- 28 Apparatus as claimed in any one of the preceding claims 2-27 including a roller located between the first and second conveyors and extending across the width of the first and second conveyors, the film being arranged to lie on said roller.
- 29 Apparatus as claimed in claim 28 in which said roller is freely rotatable.
- 30 Apparatus as claimed in claim 28 in which said roller is rotatably driven.
- 31 Apparatus as claimed in any one of the preceding claims 2-26 including a length of sheet material extending across the width of the second conveyor and in contact with the second conveyor at a location between the first and second conveyors, the leading edge of the length of wrapping film being arranged to lie upon the outer surface of said sheet of material.
- 32 Apparatus as claimed in any one of the preceding claims 2-27 including a plurality of fingers rotatably mounted between the first and second conveyors, the fingers being movable between a parked position, and a position urging the wrapping film into contact with the second conveyor.

33 Apparatus as claimed in any one of the preceding claims in which each package to be wrapped comprises a plurality of containers arranged in a group of rows and columns and standing in a shallow tray.

34 Wrapping apparatus constructed and arranged for use and operation substantially as herein described and with reference to the accompanying drawings.

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